



Reconstruction of Domestic Hot Water Supply with Ground-source Heat Pumps for two dormitories


Project Background


Name of applicant	The National University of Water and Environmental Engineering (NUWEE)
Project info/Project name	Reconstruction of Domestic Hot Water Supply with Ground-source Heat Pumps for two dormitories
Contractor	Topaz LLC Ukraine
Equipment	Gebwell Oy Finland
Project duration	September 2018 – December 2022
Contract value	€140,696.85


Project Summary

- 1 Project Summary**
- This project comprised procurement, general construction work, drilling and installation of ground-source heat pumps (GSHP) that utilise renewable ground heat for domestic hot water (DHW) heating used by the two NUWEE dormitories.
- The main objectives of this demonstration project were to improve the quality (availability) of DHW supply, reduce DHW supply costs, introduce a renewable energy source to the DHW supply system for demonstration purposes and finally to provide training for students.
- 3 Project Conclusions**
- The project covered soil heat transfer capacity tests (geological surveys), project design, installation of a GSHP and supplementary equipment (heat accumulating tanks, heat exchange unit, controllers) produced by Gebwell Oy, installation and arrangement of heat wells and collectors, network installation, control and automation, security, fire alarm systems, electrical works, etc. Training was also provided to ensure NUWEE's capacity to operate and maintain the equipment.
- Implementation of the project significantly improved the availability, quality and affordability of DHW.
- In the long term, the project has resulted in optimisation and significant (more than 3.3 times) energy savings, reducing costs for NUWEE and dormitory tenants.
- 3 Impact on Human Rights and the project's Sustainable Development Goals (SDGs)**
- The project positively impacted on human rights by supporting improvements to infrastructure and living standards, ensuring environmental sustainability and energy security and giving all consumers, including vulnerable groups, access to affordable, reliable and modern energy services.
- Overall, the project could positively impact the following SDGs:
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- 4 Project Deviations**
- During implementation, the project faced significant delays due to: a long procurement process, the spread of the acute respiratory disease

COVID-19 caused by the SARS-CoV-2 virus and related quarantine restrictions, and the Russian invasion of Ukraine.

5 Project Lessons Learnt

Lessons learnt

Soil heat transfer capacity tests are essential for determining the feasibility of the use of conduction as a heat source during the design stage.

For this project, testing revealed an optimal projected soil heat transfer at the construction site of 48-52 W/m from one borehole, based on the temperature difference between the overground soil and the return pipe set at 6 °C.

Local installation companies are able to install this kind of new technology.

Benefits of the project

1) DHW availability

Before the project, hot water was supplied by the district heating system, only during the heating period (6 months), and private electrical DHW heaters.

Following project implementation, NUWEE had access to a quality hot water supply and achieved independence from state heat supply schedules.

2) Cost savings

The previous tariff for hot water provided by the DH company Rivneteploenergo LLC was 154.57 UAH per m³. This tariff is not economically justified (due to the high price of the fuel component – natural gas) and thus is underestimated.

Based on calculations made by NUWEE using cost data for cold water and electricity usage during October 2022, the cost of the new hot water supply is 47.29 UAH per m³.

The cost savings are more than 3.3 times.

3) Demonstration showcase

The project provides significant demonstration value as a part of the Energy Efficiency Center, which was established within NUWEE with the aim of serving as a base for training and certification of energy auditors and specialists for the maintenance of internal engineering systems. It is expected to host 24 seminars annually and provide permanent training for 500 students. Thus, the project results will provide benefit not only at the regional level but also at the national level.

4) Student training

Installation of heat pumps in classrooms provides additional benefit by enabling training for teachers/students on modern ground-source heat pump applications.

Effectiveness of the project

Project implementation took a significant period of time. The project was initially approved in September 2018 and was finally successfully concluded at the end of 2022. The project deliverables comply with both FS targets and FUTF objectives, including promoting cooperation between Finland and Ukraine and identifying project opportunities.